LATEST NEWS OF THE AMATEUR AND COMMERCIAL RADIO WORLD

RIVERHEAD'S RADIO BUSIEST IN WORLD

Versatile Station Has Made Great Progress in Receiving Messages.

ANTENNA OF NINE MILES

New Type of Installation Provides for Annulling Signals Not Wanted.

Although Radio Central, near Port Jefferson, L. I., is the most powerful wireless station in the world, Riverhead, L. I., is the most versatile and also the busiest.

Radio Central can talk to Wales, France, Germany or Norway with ease, but Riverhead can listen to Wales, France, Germany, Norway and any other powerful stations that may be established simultaneously. And at the same time it can close its ears to the powerful impulses sent out only a few miles away by the giant Radio Central, New Brunswick, Merion and Tuckerton stations and to 90 per cent. of the atmospheric disturbances coming from every point of the compass.

It is more dramatic, more impressive, to hurl radio messages across three or four thousand miles of land or water than to pick them up at the other end. That is why almost every person interested in radio knows a good deal about Radio Central and its 200 kilowatt alternators and very little about Riverhead, which picks up and revives once powerful electromagnetic waves after their long leap across the Atlantic.

From an engineering standpoint, however, what has been accomplished at Riverhead in the receiving line is at least as remarkable as what has been done at Radio Central. Riverhead, however, does its work quietly and without ostentation; Radio Central's tall towers and teriffic currents advertise it to the world.

Why Riverhead Is Versatile.

A few years ago in this country, and at the present time in all other countries, every sending station had its compliment in a receiving station, located about fifty miles from it, and connected with it by telegraph lines. The one station talked; the other listened. Now Radio Central, New Brunswick, Marion and Tuckerton all talk; and Riverhead competently handles incoming traffic of all the European centers with which they are connected. The explanation of Riverhead's efficiency is the wave antenna.

The station is not a network of antennae such as the mind would picture. It has simply one antenna consisting of two copper wires nine miles long, strung on ordinary telegraph poles. One station building contains the receiving apparatus which separates the conglomeration of signals received from Norway, England, France and Germany, and transfers them directly and automatically over trunk line wires into the Broad street traffic office in New York city, where all incoming and outgoing messages are handled. The system of concentration, achieved after much experimentation, makes it possible to add new receiving circuits for communication with any new station in Europe at a negligible cost simply by installing a new set of receiving apparatus on one of the shelves provided for that purpose at the station.

Expert Tells About Station.

A description of certain phases of the Riverhead station, especially with regard to the manner in which it eliminates static, and of what may develop in the future, has been given by Ernst F. W. Alexanderson, chief engineer of the Radio Corporation of America. He said:

"The antenna is of a new type which gives uni-directional reception so oriented as to receive signals from the overocean transmitter and annul signals from all other directions, including the powerful home transmitter nearby.

"The antenna consists of two copper wires strung on ordinary poles, like a telephone line, and extending over a distance of nine miles. From this antenna a number of separate receiving circuits of different wave lengths are fed without the slightest mutual interference or weakening of the signals.

"Important as it is, from the point of view of centralization, to be able to receive an indefinite number of signals from the same antenna, the greatest importance in the use of this new receiving system is its remarkable properties of suppressing atmospheric disturbances, or the so-called 'static,' which hitherto has been the bane of radio communication. The attainment of these results is not an accident, it is the reward of development work covering a number of years.

Principle With Possibilities.

"The 'wave antenna' as now used in Riverhead is the practical answer to the receiving problem of to-day. It is a milestone in the development of the principle of directive reception. This is a principle which has almost unlimited possibilities.

"The practical form of receiving system which was described in one of my papers in 1919 was used by the United States Navy during the war, and became known as the barrage 'receiver.' It consisted of two antennae one-quarter wave length long, balanced against each other. The wave antenna of to-day does not require any balancing. The receiver of the future will probably consist of antennae several wave lengths long or several wave antennae balanced against each other.

"The controlling idea in this development is a mental picture which we now have of the nature of the disturbance which we wish to suppress. We call it 'static' because it was assumed, in the past, that it was of the nature of static electricity. The hypothesis which is the basis of our modern work is, however, different.

"We imagine the ether as a disturbed ocean with the waves of every length rolling in from all directions. These waves are of the same nature as the signal waves. Those disturbing waves which are of different wave length from our signals can be shut out by the same means as we use for shutting out other signals; that is, by tuning.

Disturbing Waves Come In.

"But the disturbing waves which have the same wave lengths as our signal and in all respects of the same nature pass through our tuning system like the signal. We must therefore find some other basis for discrimination than wave length.

"If we can construct a receiver which is sensitive only to waves coming from one direction then we can shut out waves from all other directions, even if they have the same wave length. This idea started us on the work of directive reception. Theoretically there is no limit to the improvement attainable in this direction. We might build a receiving antenna focused on one transmitting station in Europe, but the antenna might be a system of telephone wiring covering the State of New York.

"It is an attractive subject for theoretical analysis, and it can be shown mathematically how extens e antenna systems can be made with unlimited directivity. The well known 'loop vertical directive antenna' has a deaf ear in one direction, but receives signals and disturbances from three directions. The wave antenna turns its deaf ear to three directions and receives only from the fourth direction. For those who wish to understand the characteristics of our modern receiving system, in order to make use of it, a popular explanation may be of some guidance.

"Imagine the antenna to be a long, narrow lake, and the wind is the signal, and a cork, floating on the waves that beat against the shore, the detector. If the observer stands at one end of the lake he will observe waves beating against his shore only when the wind blows lengthwise of the lake, from the opposite shore. When, on the other hand, the wind blows from his side of the lake the beating waves appear in the opposite end, while his shore is calm.

This, at least, would be the case if the lake had smooth sand beaches on which the waves would spend their force. But, if it has steep, rocky shores, the waves will be reflected back and forth so that the whole lake will be rough. The waves, which indicate the signal wind, would thus appear at both ends of the lake, regardless of the direction of the wind. This must be avoided.

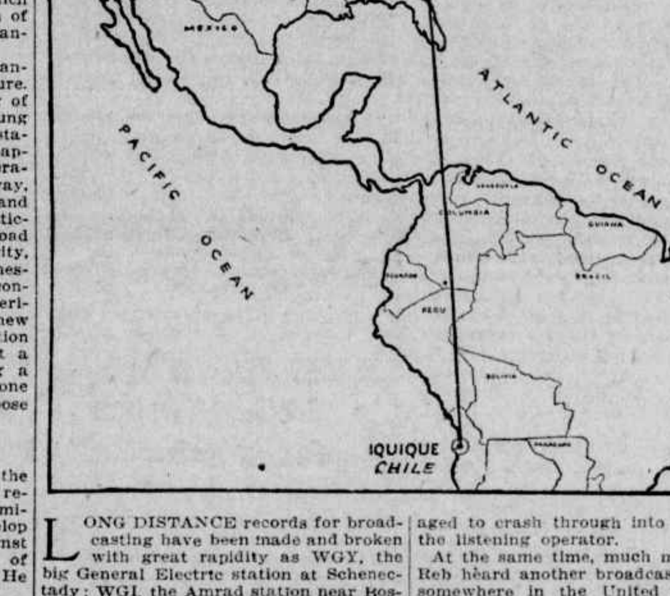
"The wave antenna is therefore made with ends corresponding to the sandy beach. It terminates in a resistance which is carefully adjusted so that all wave energy is absorbed and none is reflected.

"The practical advantages of the use of the wave antenna are: The elimination of something like 90 per cent. of the atmospheric disturbances and the possibility of concentrating all reception in one station. The developments which I have described show now that a practical solution has been found for the atmospheric disturbances in transoceanic communication. The same solution has been applied to ship to shore communication, with the result that the ocean liners are in touch with our Cape Cod station as soon as they leave the English channel."

The stations from which signals to Riverhead are sent almost continuously are Bordeaux, sending on 23,000 meters; Carnarvon, Wales, 14,100 meters; Stavanger, Norway, 12,000 meters; Nauen and Eivedese, Germany, 12,600 and 14,700 meters, respectively.

Some of the Shelves at Riverhead

KDKA Crosses the Equator



LONG DISTANCE records for broadcasting have been made and broken with great rapidity as WGY, the big General Electric station at Schenectady; WGI, the Amrad station near Boston, and the Westinghouse stations WJZ at Newark and KDKA at East Pittsburgh have reached out farther and farther, but now a record has been established which is going to be hard to beat.

Far down at Iquique, Chile, about 1,400 miles below the equator and 4,200 miles from East Pittsburgh, Frank S. Reb, chief radio operator of the Grace liner Santa Luisa, caught the strains of a concert. The music was running through some troublesome atmospheric, but managed to crash through into the ears of the listening operator.

At the same time, much more faintly, Reb heard another broadcasting station somewhere in the United States, but the nearest he could come to distinguishing the call was WFD. Capt. Williamson of the Santa Luisa and a number of passengers listened in on the signals, eager to get the news and music of home, which was coming to them from another hemisphere.

Owing to the fact that static is now beginning to make itself heard most emphatically, it is doubtful whether WGY or KDKA will establish any longer distance records until next fall, when cool weather brings better radio conditions.

SHOW IN BROOKLYN DRAWS RADIO FOLK

Million Dollars Worth of Equipment Furnishes Plenty to Discuss.

Despite the fact that one week is the usual length of time that any show can run in New York, the Brooklyn Radio Show at the Ice Palace is entering its second week to-morrow with large numbers eager to look over the million dollars' worth of equipment on view.

The members of the Electrical Contractors Association of Brooklyn and Queens, who are running the show, have discovered in the course of their busy week that the patrons of the exhibition can be divided sharply into two classes—those who know nothing at all about radio and those who know everything about it. The experts explaining things have come to view every one at the show cautiously, for a twelve-year-old boy, whose thoughts would not seem to ascend above Eskimo pie, or a mild old gentleman with the eye of a book collector may turn out to know much more about the theory or practice of radio than they do themselves.

The radio "bugs" who go to the show examine minutely every bit of the million dollars' worth of equipment on view, comparing, criticizing or praising different makes in a language which gives the average visitor an earache and even puzzles some of the contractors. Their scorn for the species which seeks to learn something about radio is scorching.

The inquiring ones, however, seem, in this mechanical age, to have an electrical grounding which enables them to pick up the theory of radio in quick time. Their greatest confusion arises from the fact that radio sets are by no means standardized as yet. One set may be in boxes, with just a few knobs to turn; another in panels bristling with all sorts of alarming gadgets and some are heterogeneous collections of scattered apparatus resembling the insides of a chess automaton.

The question most frequently asked at the show is, "Who invented radio?"—a question which requires an illustrated lecture to answer. Many of those present appear to consider it in much the same light as a washing machine. The answer made by one well known exhibitor is as follows:

"No one person invented radio. One might as well ask who invented the automobile as to ask who invented radio. Many people believe Marconi was the first man to receive or transmit messages by wireless, but he was not the first to accomplish this.

"In 1860 James Clark Maxwell, a Scotch physicist, published a paper on 'The Electromagnetic Theory of Light.' The development of this theory has led eventually to the radio, for, in its time, it was a bold departure from accepted theories and was proved by Maxwell by mathematics, as far as mathematics can prove, that electrical waves could be produced in the ether.

"Twenty-five years later Heinrich Hertz, a young experimenter in the laboratory of the University of Bonn, found those waves which had been discovered mathematically by Maxwell. Hertz was the first man to produce those waves and detect them. The waves were known to science thereafter as 'Hertzian waves.'

"Marconi, the Italian inventor, picked up the theories of Maxwell, furthered the discoveries of Hertz and conducted experiments with the end in view of commercializing these mysterious waves by harnessing them to work for mankind.

"After Marconi, a score of inventors made contributions to the science. Their labors have made radio telephony the modern marvel."

Several unusual features in addition to the usual radio concerts and demonstrations are planned for this week. To-morrow night city officials and members of the Chamber of Commerce, the Brooklyn Motor Vehicle Dealers Association, the Brooklyn Florists Association. The Real Estate Board of Trade and similar organizations will attend. A special musical program will be given.

On Wednesday ladies' night will be observed. At each booth will be displayed some sort of electrical appliance of feminine appeal. On the closing night, Saturday, the contractors will have as their guests all the electrical contractors of the other boroughs.

BROADCASTING STATIONS HAVE INCREASED TO 105

One Church and 14 Department Stores in List.

A new insight into the rapid growth of the radio telephone in popular esteem is given by statistics prepared by Arthur Wiesenberger, director of the bureau of reseach and information of the National Retail Dry Goods Association.

There are now 105 broadcasting stations licensed by the Government to send out programs on 360 meter wave length. The number has jumped 50 per cent. within a month. The stations are distributed as follows: Atlantic seaboard, 28; middle West, 36; Pacific coast, 36, and Gulf, 5. Fourteen of the stations are maintained by department stores, ten by newspapers, seven by universities and colleges and one by the Church of the Covenant, Baltimore. The biggest jump in stations has been in the department store class. Big stores everywhere are preparing to obtain licenses to broadcast.

At present 202 concerns are manufacturing radio equipment, thirty-four turning out complete receiving sets. There are also twenty-three manufacturers of raw materials and parts used in the construction of radio apparatus and thirty-four manufacturers of A and B batteries and battery recharging devices. Nine new magazines devoted to radio have been started and trade journals and newspapers and magazines are devoting much space to the subject.

COLLEGE RADIO PIONEERS.

Broadcasting Operated at Union Since Fall of 1920.

SCHENECTADY, May 13.—Although Union College was organized in 1795 it was still young enough to lead the procession in the matter of radio broadcasting.

In the early fall of 1920, before any of the large broadcasting stations were regularly operated, the Union College Radio Club began sending out musical programs once a week. Students who returned to their studies after war service, realizing the great progress which had been made by radio during the war, devoted their spare time to building a station, and on October 14, 1920, sent out the first program, consisting of phonograph records.

Until this season the college club used a homemade set with six 50 watt radiotrons. It has just installed a General Electric outfit with four 200 watt tubes, thus making it four times as efficient.

BALTIC AT LIVERPOOL RADIOS TO CHATHAM

Makes Record by Communicating Every Night of Trip.

A record in radio telegraph service between ship and shore was recently reported by the steamship Baltic of the White Star Line. In a recent voyage from New York to Liverpool she was in communication every night with the Chatham, Mass., station of the Radio Corporation of America. Messages were exchanged while the Baltic was anchored at Liverpool Bar, when over 3,000 miles separated the two stations.

The Chatham station is equipped with a continuous wave transmitter using pliotron tubes, and at the time of the Baltic's record it was rated at one and a quarter kilowats in the antenna. Since that time the power has been raised to three kilowatts and therefore new daylight records should be possible.

$500 FOR RADIO AMATEURS.

Prizes Will Be Awarded at Show for Home Made Sets.

Five hundred dollars will be distributed in prizes to radio amateurs exhibiting home made sets at the New York radio show, to open May 22 at the Seventy-first Regiment Armory.

Any person not directly or indirectly engaged in the manufacture or sale of radio apparatus will be permitted to compete. He may exhibit as many sets as he desires. The judges, headed by Miller Reese Hutchison, inventor and electrical engineer, will judge the receiving sets on a point basis, 50 points for efficiency of reception and 10 each for appearance, simplicity, wiring and connections, economical cost and "hook-up" diagram.

The first prize will be $100, second $75, third $50 and the others down to $5. Many applications for blanks have already been received by E. C. Buchignani, managing director. Entries close May 17.

The Radio Corporation has leased the largest space at the show and the newly formed Radio Chamber of Commerce will also exhibit. Through an executive order signed by Secretary Denby, the navy's remarkable new radio compass will be exhibited.

WOMEN JOIN RADIO CLUB.

The Metropolitan Radio Club of Brooklyn, with headquarters in the Eastern District Y. M. C. A., Brooklyn, has organized a women's chapter. Miss Alma Swenson is secretary.

BROADCASTS SHIP POSITIONS.

Through arrangements with the Radio Corporation of America, the Newark broadcasting station, WJZ, now sends out daily at 8 P. M. the noon position of vessels at sea, as reported to the radio company's stations along the Atlantic coast.

EVENTS OF THE WEEK IN THE RADIO FIELD

Mrs. August Belmont to Speak on the Work of the American Red Cross at WJZ on Wednesday—Many Other Lectures.

The program for the week of the various broadcasting stations which can be heard within a radius of several hundred miles of New York are presented herewith. During the week THE NEW YORK HERALD will print the daily programs of the stations each morning.

Times given are daylight saving. Tune instruments for 360 meter waves, except in the case of WVP, which sends on 1,450 meters.

Station WJZ, Newark.
(Westinghouse.)
WEEKDAYS.

9:0 A. M.—Agricultural reports and prices as released by the New York, New Jersey and Federal Agricultural Bureaus; musical program.
10:00 A. M.—Musical program.
11:00 A. M.—Musical program.
12:00 M.—Agricultural reports and prices as released by the New York, New Jersey and Federal Agricultural Bureaus; weather forecast; musical program.
12:55 to 1 P. M.—Standard time signals from Arlington.
1:00 P. M.—Musical program.
2:00 P. M.—Shipping news (excepting Saturday) by the Marine Engineering and Shipping Age; musical program.
3:00 P. M.—Musical program.
4:00 P. M.—Baseball scores of the American, National and International League games; women's fashion news by the Women's Wear daily fashion newspaper; musical program.
5:00 P. M.—Baseball scores of the American, National and International League games; musical program.
6:00 P. M.—Official weather forecast; agricultural reports and prices as released by the New York, New Jersey and Federal Agricultural Bureaus; shipping news (excepting Saturday) by the Marine Engineering and Shipping Age; musical program.
7:00 P. M.—Final baseball scores.
8:00 P. M.—Final baseball scores; marine news by the Radio Corporation of America.
10.52 to 11 P. M.—Official Arlington time signals.
11:01 P. M.—Official weather forecast.

SUNDAY.

3:00 P. M.—Radio chapel services; Mothers' Day exercises conducted by Miss Frances M. Hedden of the New Jersey Sunday School Association; sermon, "Our Mothers," by Rev. George C. Vincent, D. D., pastor of the South Park Presbyterian Church, Newark, N. J.; Sunday school lesson as written for the Christian Herald by the Rev. Samuel D. Price, D. D., secretary of the World's Sunday School Association. Those who listen in to this service will include hundreds of thousands of members of the "home department." The program includes "Songs My Mother Taught Me," "Mother, My Dear," and "Lullaby," by Miss May C. Korb, soprano soloist.
4:00 P. M.—Literary vespers, "The Return to Nature," by Edgar W. Burrill.
4:15 P. M.—Concert by the Hampton Quartet, from the Hampton Normal and Agricultural Institute, Hampton, Va. This negro quartet is known from coast to coast for their singing of plantation melodies or "spirituals." The program will consist of negro folk songs: "I Want To Be Ready," "Ride On, Jesus," "Go Down, Moses," "Little David, Play on Your Harp," "Keep Me from Sinking Down," "Four and Twenty Elders," "The Old Ark," "The Gospel Train's a Coming," "I Couldn't Hear Nobody Pray," "Steal Away" and "Swing Low, Sweet Chariot." Robert Ogden Purves, field secretary of Hampton Institute, will talk on the history and purposes of the school.
5:30 P. M.—"Anthracite Mining," by D. C. Ashmead, anthracite editor of *Coal Age*.
5:45 P. M.—"Not charity, but a chance for every child in the United States," by Irene Sophie Loeb, president of the Board of Child Welfare of New York city.
6:30 P. M.—Readings and records from the "Bubble Books That Sing," by Ralph Mayhew, courtesy Harper & Bros.
6:45 P. M.—"Sandman Stories," told by Kasper Seidel, courtesy Harper & Bros.
7:00 P. M.—"'Wonderful Tar Baby,' 'B'rer Rabbit and the Honey,' 'Brer Fox and the Little Rabbits'" and other negro dialect stories, by A. C. Kraven.
7:30 P. M.—"The Romance of the Sea," by Capt. Arthur H. Rostron, C. B. E., R. D., R. N. R., of the Curard steamship Mauretania.
7:45 P. M.—"The Health of the Child," by Dr. J. N. Myers, courtesy MacMillan Co.
8:00 P. M.—Drummond's French Canadian dialect stories will be told by W. J. Bryden, who has specialized on these stories for the last ten years.
8 45 P. M.—Sacred music by the Aeolian Orchestrelle and Duo-Art Piano.
9:00 P. M.—Concert by the Elsa Fischer String Quartet, Elsa Fischer, director and first violin; Isabel Ranch, second violin; Lucie Neidhardt, viola, and Carolyn Neidhardt, 'cello: "Adagio," Becker; "Menuet," Haydn; "Steps Song," Ernest Carter; "Scherzo," Schubert; "Andante Cantabile," "Scherzo," Tschaikowsky.
9:15 P. M.—"Camping," by Alexander M. Dodge of White Plains, N. Y.

MONDAY.

6:00 P. M.—"Business and Industrial Conditions in the United States" as observed by the National Industrial Conference Board.
7:00 P. M.—Stories from *St. Nicholas Magazine*, courtesy of the Century Company.
7:30 P. M.—"How to Get a Job," by W. B. Ohmstead.
7:45 P. M.—Concert by the orchestra and choral clubs of the Young Women's Christian Association of Newark; address by Mrs. Robert L. Dickinson, member of the National Board of the Y. W. C. A. of America. "What the Y. W. C. A. Means to Me," in poems and prose, by four members; negro spiritual songs by a double quartet of colored girls from the Sojourn Truth Branch; musical selections by sixty members of the Federation of Industrial Clubs.
9:30 P. M.—Recital by Miss Pauline Jennings, dramatic soprano, who will be accompanied by her vocal teacher, Miss Fay Foster of New York. Program—Fairy songs: "Fairy Children," "Canterbury Bells" and "Blue Bell—Dew Bell," by Besley. Irish songs: "Irish Names," "Murty Kerrigan" and "Old Doctor McGinn," by Foster. Children's songs: "Secret Languages," Foster; "The Cupboard," McKinney, and "Lilac Tree." Miscellaneous: "Now Sleeps the Crimson Petal," Guliter; "Spinning Wheel Song," Foster; "Flower Time Weather," Foster; "When Lovers Part," Foster. Aria from "Mignon," Connaise.

TUESDAY.

7:00 P. M.—"Man in the Moonnn" stories (c), Newark Sunday Call.
7:30 P. M.—Mme. Petrova, noted actress, author of the play "The White Peacock," will sing, recite and talk to the invisible audience. She will tell about her stage and motion picture experiences and probably tell about the love story of Old Spain which she has woven into her play "The White Peacock." Mme. Petrova will soon begin a worldwide tour.
7:50 P. M.—"Children's Stories," by Podraic Colum, courtesy McMillan Co.
8:00 P. M.—"The Eyes of the World," by Winifred Hathaway, Brooklyn Chapter of American Red Cross Society.
8:10 P. M.—"Broadcasting Broadway," by Bertha Brainard.
8:20 P. M.—"Personal Hygiene," by Dr. Donald B. Armstrong of the National Tuberculosis Association.
8:30 P. M.—Concert by the Standard Oil Band of New Jersey, Charles Biedman, director.
9:30 P. M.—Concert by the Police Octet of Newark, Sidney A. Baldwin, director. Program: "1921 Medley," Remick; "About Clock," Hammond; "A Perfect Day," Bond; "The Wise Old Owl," Nevin; "My Isle of Golden Dreams," Blaufuss; "Sunset," Van de Water; "Medley from the South," Pike; "Should Auld Acquaintance Be Forgot," Bostford.

WEDNESDAY.

6:00 P. M.—"Review of the Iron and Steel Industries and Their Relation to General Business Conditions," by the Iron Age.
7:00 P. M.—"Animal Stories," by Florence Smith Vincent; courtesy New York Evening Telegram.
7:30 P. M.—"Recollections of a Sky Pilot," by Major Chaplain John J. Allan, formerly senior chaplain of the Seventy-seventh Division, A. E. F. Major Allan will also play "Aria from Lucia" and Handel's "Largo" on the cornet presented to him by the boys while in France.
8:00 P. M.—Address of Secretary Herbert Hoover, as presented before the convention of the National Electric Light Association at Atlantic City.
8:10 P. M.—"The Work of the American Red Cross," by Mrs. August Belmont of the central and executive committees of the National American Red Cross. Mrs. Belmont will be remembered by many as Miss Eleanor Robson, one of the most charming and successful actresses on the American stage. Mrs. Belmont's other activities are equally noted. From September, 1917, to March, 1918, she served with the Red Cross in the French, British and American lines' hospitals. Since June, 1917, Mrs. Belmont has also been a member of the executive committee of the New York County Chapter of the American Red Cross, and from June, 1918, to March, 1919, she served as assistant to the War Council of which the late Mr. Davison was chairman.
8:25 P. M.—Concert by the Russel Kingman String Quartet of East Orange.
9:20 P. M.—"Value of Good Manners," by Margaret Emerson Bailey; courtesy Doubleday Page & Co. of New York.

THURSDAY.

7:00 P. M.—"Jack Rabbit Stories," by David Cory; courtesy New York Evening Mail.
7:30 P. M.—"The Social Menace of the Rat," by Dr. Charles B. Craster, health officer of the city of Newark.
7:45 P. M.—"Poland," by A. N. Newrench, Foreign News Correspondents' Association.
8 P. M.—Addresses of United States Attorney-General Daugherty, Haley Fisk, president of the Metropolitan Life Insurance Company, and Carl Jackson, president of National Association of Utility Commissioners, as delivered before the convention of the National Electric Light Association at Atlantic City.
8:30 to 10:15 P. M.—The opera "Pagliacci," in two acts, by R. Leoncavallo, will be broadcasted under the direction of Charles D. Isaacson of the New York Evening Mail. Program: "Face to Face with Leoncavallo" and "The Story of 'Pagliacci'" will be given by Charles D. Isaacson. Characters in the drama: Nedda (in the play "Columbine," a strolling player, wife of Canio), Rose Rachow, soprano; Canio (in the play "Pagliacci" master of the troupe), Leon Fastovsky, tenor; Tonio (in the play "Taddea" the clown), Constantin Buketoff, baritone; Peppe (in the play "Harlequin"), Alfonso Romero, tenor; Silvia (a villager), Lazar S. Samoiloff, barytone. The scene is laid in Calagria, near Montalto, on the Feast of Assumption, period 1865 and 1870.

FRIDAY.

7 P. M.—"Man in the Moon" stories (c) Newark Sunday Call.
7:30 P. M.—"Athletics," by William F. Haggerty, former athletic director of the Crescent Athletic Club.
7:45 P. M.—"Colors and Their Uses," by Martha J. Phillips.
7:55 P. M.—"The Trend of Business Conditions," by the Magazine of Wall Street.
8 P. M.—"Broadcasting Broadway," by Bertha Brainard.
8:15 P. M.—Popular dance music by the Wells Harmony Orchestra of Newark, Jack Allen, director.
9 P. M.—Literary evening, conducted by the editorial staffs of the Outlook, Scientific American and Harper & Bros.

SATURDAY.

7 P. M.—"Uncle Wiggily's Bedtime Stories," by Howard R. Garis, the author of the "Uncle Wiggily Stories" printed in many newspapers and frequently appearing on K. D. K. A.'s and WBZ's radio programs.
7:30 P. M.—Children's stories, by E. Lester Pearson, a McMillan author.
7:45 P. M.—"Fashion Talks," by an editor of Harper's Bazaar.
8 to 10:15 P. M.—Program arranged by the Conn Company of New York. Concerts by the Strand Theater Orchestra of New York and the Elkins Orchestra of the Palais Royal, Earl Eduarde, conductor; also a quartet and soloists.

Station WGY, Schenectady.
(General Electric.)
MONDAY.

1:30 P. M. (Eastern standard time)—Noon stock market quotations.
7 P. M.—Stock and produce market quotations and reports; baseball results and late news bulletins.

TUESDAY.

9:10 P. M.—A. F. Van Dyck, a G-E radio engineer, will deliver the second of a series of short addresses on radio reception.
1:30 P. M.—Early stock market quotations.
7:00 P. M.—Produce and stock market quotations; baseball results in National, American and International leagues; news bulletins.
8:45 P. M.—Concert program. Mixed quartet selection: Miracle of Love, McKee; Mrs. Earl Case, soprano; A. T. Batty, tenor; Mrs. P. A. Slade, alto; H. G. Arnold, bass; Miss Jeannette Sutson, accompanist; alto solo, "My Love Is Live a Red, Red Rose," Hastings, Mrs. P. A. Slade; violin solo, Prelude, Rachmaninoff, Miss Lillian Rogers; baritone solo, Invictus, Bruno Huhn, H. G. Arnold; readings, (A) The Love Knot, Nora Perry, (B) Cloidna of the Isle, Arthur Stringer, Mrs. Bertha S. Hardy; soprano solos, (A) I Know, Spross, (B) Elegie, Massenet, Mrs. Earl Case; violin obligato by Miss Lilian Rogers; Mixed Quartet selection: Rose of My Heart, Lohr; tenor solo, At Dawning, Cadman, A. T. Batty; reading, The Sacrifice, anonymous, Mrs. Bertha S. Hardy; duet, Trot Here, Trot There, Messager, Mrs. Case, soprano, Mr. Arnold, barytone; violin solo, Chant Sans Paroles, Tschaikowsky, Miss Rogers; Carry Me Back to Old Virginny, Bland, Mixed Quartet.

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THURSDAY.

1:30 P. M.—Early stock market quotations.
7:00 P. M.—Produce and stock market quotations; baseball results; news bulletins.
8:45 P. M.—Concert program: Piano solo, "Lustspiel Overture" (Keller-Bella), Asa O. Coggeshall; reading, "Jimmy, Boy" (Adams), Marjorie Tyler; instrumental trio "Medley of Popular Airs" (Teran), Unique Musical Trio; barytone solo, "Little Mother of Mine" (Burleigh, Mr. Charles Coggeshall, tenor; saxophone solo, "When Deum in E Flat" (Dudley Buck), Mrs. N. M. Veino, soprano; Charles L. Mead, bass; Mrs. J. L. Hulstrom, alto, and A. O. Coggeshall, tenor; saxaphone solo, "When You and I Were Young, Maggie" (Tilford), Harry P. Cheney, with violin obligato; duet, "The Sweetest Story Ever Told" (Stultz), Mrs. Hulstrom, contralto, and Mrs. Veino, soprano; address by L. A. Wilson of the Federal Board for Vocational Training; reading, "A Model Sermon" (Smith), Miss Marjorie Tyler; instrumental trio, "The Trail of Long Ago" (Holmes), Unique Musical Trio; violin solo, "Berceuse" from "Jocelyn" (Goddard), Harvie B. Coggeshall; soprano solo, "The Swallow" (Del Acqua), Mrs. N. M. Veino; mixed quartet, "Old Virginia" (Foster), unaccompanied.

FRIDAY.

1:30 P. M.—Early stock market quotations.
7:00 P. M.—Produce and stock market quotations; baseball results; news bulletins.
7:00 P. M.—Seventh chapter of "Alice in Wonderland," Kolin Hager, reader.
7:40 P. M.—Health talk, "Safe Water for Campink Parties," by Dr. Hermann M. Biggs, New York State Health Department.
8:45 P. M.—Concert program: Fox trot, "Tell Her at Twilight" (Donaldson), Meyerhoff's Orchestra, David Meyerhoff, leader and pianist; banjorine solo, "Andante et Polonaise" (Mezzacapo), Harry Meyerhoff; fox trot, "Dear Old Southland" (Mills), Meyerhoff's Orchestra; piano solo, "Kitten on the Keys" (Confrey), David Meyerhoff; soprano solo, "When the Birds Go North Again" (Willeby), Miss Nina White, Mrs. Weekes-Kinum, accompanist; fox trot, "Just a Little Love Song" (Cooper), introducing "I Got a Gal" (Phil Baxter), Meyerhoff's Orchestra; fox trot, "Down the Old Church Aisle" (Ray Perkins), Meyerhoff's Orchestra; soprano solo, "The Lass with a Delicate Air" (Arne), Miss Nina White; violin solo, "Eli, Eli," ancient melody, Harry Meyerhoff; fox trot, "The Sheik" (Ted Snyder), Meyerhoff's Orchestra; soprano solo, "Why" (Chaminade), Miss White, Mrs. Weekes-Kinum, accompanist; fox trot, "Good-by, Shanghai" (Meyers and Johnson), Meyerhoff's Orchestra.
11:30 P. M.—Piano solo, airs from "Rigoletto," Verdi, Erno Rapee, Duo-Art. Instrumental trio, "Along the Way to Waikikee," Hawaiian, Schenectady Hawaiian Trio, C. Stegmiller, R. Neander, S. Wright. Reading, "The School Boy's Composition on a Hoss," Browne, R. E. Russell. Fox trot, "Old Fashioned Girl," Jolson, Schenectady Hawaiian Trio. Reading, "The Old Fogey," Elton, Mr. Russell. Waltz, "Drowsy Waters," Verran, Schenectady Hawaiian Trio. Piano solo, "Polonaise opus 40, No. 1," Chopin, Ignace Jan Paderewski, Duo-Art. Reading, "The Old Man and Jim," James Whitcomb Riley, Mr. Russell. Fox trot, "Angel Child," Davis, Schenectady Hawaiian Trio.

Station KDKA, Pittsburgh
(Westinghouse).
SUNDAY.

10:45 A. M.—Services of the Point Breeze Presbyterian Church, Fifth and Penn avenues, Pittsburgh, Pa., Dr. P. H. Barker, minister.
2:45 P. M.—Children's Bible story, "A Baby Story for Mothers." Note—This story is given in honor of Mothers' Day.
3:00 P. M.—Radio chapel at Station KDKA, conducted by the Rev. Royal N. Jessup, pastor Shady Avenue Baptist Church, Shady avenue, Pittsburgh, Pa.
7:30 P. M.—Services of the Calvary Episcopal Church, Pittsburgh, Pa., the Rev. E. J. Van Etten, rector.

MONDAY.

7:00 P. M.—Weekly review of business conditions. National Industrial Conference Board.
8:00 P. M.—"The Clerical Worker," Miss Edna Graham, in charge women's employment, Westinghouse Electric and Manufacturing Company, East Pittsburgh. From station KDKA at East Pittsburgh. "Teaching as a Vocation," Mrs. Alice Carmalt, Board of Education, University of Pittsburgh. From Pittsburgh Post studio.
9:00 P. M.—Variety of vocal and instrumental selections by the members of the Glee Club of the Pennsylvania College for Women, Mabel Davis Rockwell, director.

TUESDAY.

7:00 P. M.—Weekly dress talk.
8:00 P. M.—"Domestic Science," Miss Jean Fales, director of costume economics, Carnegie Institute of Technology, Pittsburgh. "Nursing—A Profession," Mrs. Ford of the Pittsburgh Public Health Nursing Association, Pittsburgh. From the Pittsburgh Post Westinghouse studio.
9:00 P. M.—Sonata recital by Ralph Lewando, concert violinist; Julia Gibansky Kasanoff, concert pianist. From Pittsburg Post studio.

WEDNESDAY.

7:00 P. M.—"Anthracite Coal Mining," Dover C. Ashmead, anthracite editor Coal Age, Kingston, Pa. From Pittsburgh Post studio.
8:00 P. M.—"Pittsburgh—A Cultural Center," Dr. W. J. Holland, director Carnegie Museum, Carnegie Institute, Pittsburgh. "Engineering," F. L. Bishop, dean School of Engineering, University of Pittsburgh. From Pittsburgh Post studio.
9:00 P. M.—Pleasing entertainment by Elmer Stoltz barytone, assisted by violin, 'cello and piano.

THURSDAY.

8:00 P. M.—"Medicine," Dean R. R. Huggins, University of Pittsburgh. "Why Pittsburgh Needs a City Plan." By a member of the Junior Civic League (the speaker will be announced later in the daily newspapers). From the Pittsburgh Post-Westinghouse studio.
9:00 P. M.—Versatile entertainment by Mrs. Etta Cunningham, concert soprano; Fred Lotz, concert pianist, and a saxophone trio.

FRIDAY.

8:00 P. M.—"The Draftsman and His Work," C. C. Leeds, School of Drafting, Carnegie Institute of Technology, Pittsburgh. "Insect Pests and Disease of Vegetables," W. D. Benedict, extension representative Allegheny County Farm Bureau. From Pittsburgh Post studio.
9:00 P. M.—A variety of musical selections by Miss Lillie E. Steber, coloratura soprano and Phyllis Geraldine Gray, pianist.

SATURDAY.

3:00 P. M.—Popular concert by the University Club of Pittsburgh. From Pittsburgh Post Studio.
8:00 P. M.—"The Social Worker," Mrs. M. C. Burnett, head of Department of Social Work, Carnegie Institute of Technology, Pittsburgh. "Chemistry—of Bread," Dr. H. A. Kohman, in charge research work on bread making, Mellon Institute, Pittsburgh. From Pittsburgh Post Studio.
9:00 P. M.—Mixed quartet, Miss Alice Smith, soprano; Mrs. Jean Gros, alto and reader; F. Robert Coe, bass, and Jean Gros, tenor.

Station WGI, Medford Hillside, Mass.
(Amrad.)
WEEK DAYS.

2:55—Music.
3:00—Current events (Boston Traveler).
7:30—Baseball scores. Late news flashes (Boston American), except on Tuesdays and Thursdays, when at 7:45.
7:45—Boston police reports, except on Tuesday and Thursday, when at 7:55.

SUNDAY.

7:45 P. M.—"A Chance to Grow Up," by Henry Lawrence Southwick, president Emerson College of Oratory.
8:00 P. M.—Radio church service. Sermon by the Rev. H. Douglas Pierce, pastor Winter Hill Baptist Church, "A Commission for Life," assisted by the Church Male Quartet, William F. Pollard, Jr., Leonard O. Waters, tenors, and W. S. Trefry, Francis Howland, basses. Selections: "The Church in the Wildwood" (Pitts), "For You and for Me" (Thompson); solo by William F. Pollard, Jr., "Mother of Mine" (Tours).
8:50 P. M.—Master Fred Savin, boy soprano soloist, Church of the Advent, Back Bay. Accompanied by E. Lewis Dunham.

MONDAY.

7:45 P. M.—Weekly business report.
7:55 P. M.—"College Music," by Leo Rich Lewis, A. M., professor of music and theory of music, Tufts College, assisted by members of the Tufts College Glee Club.
8:30 P. M.—Donald E. Robinson, boy soprano; Marion E. Robinson, violin; Mrs. A. D. Robinson, accompanist.
8:45—Edna Schenk, dramatic soprano. Selections: Aria from "Madame Butterfly," Enrico Caruso's "For You Alone," "Lullaby Song" from "Jocelyn."

TUESDAY.

7:30 P. M.—Bedtime story, "Flower Story" (Folts, Youth's Companion), read by Miss Eunice L. Randall.
8:10 P. M.—Griffith Houston, soprano, in negro spiritual and folk songs, "Suwanee River," "Deep River," "Go Down Moses," "My Old Kentucky Home," "Wid the Moon, Moon, Moon."
9:00 P. M.—Piano recital by Herbert Boardman. Selections: "Novelette" MacDowell); "Waltz in C Sharp Minor," "Nocturne in B Major," "Polonaise in A Major" (Chopin); "Song of Spring" (Zarzycki); "Festivity" (Hadley).

WEDNESDAY.

7:55 P. M.—"Possibilities of Inexpensive Meat," by Miss D. H. Goodwin, of Mass. Division of Markets, Department of Agriculture.
8:10 P. M.—The St. Lawrence Waterways Project," Col. Charles R. Gow, president Associated Industries.
8:30 P. M.—Charles W. Ellis, tenor soloist.
8:45 P. M.—Commonwealth Jazz Orchestra. J. Churchill Bacon, Jr., piano; Jack Brennan, violin; Frank Strecker, cornet; Bob Beatey, banjo; Wesley Angell, trombone; Benny Kaplan, saxophone; Davie Sullivan, drums. Selections: "Ten Little Fingers," "When Shall We Meet Again," "On the Gin Gin Ginny Shore," "The Sheik."

THURSDAY.

7:30 P. M.—Bedtime story, "Peter, Jane and the Bear," read by Miss Eunice L. Randall.
8:00 P. M.—"Influence of Diseases of the Nose and Throat Upon the Health of Children," by Dr. Frederick L. MacDonald of Waltham.
8:15 P. M.—Arthur Cleveland Morse, Boston's prominent composer-pianist. Selections: "Melodie Mignone," "Serenade Popularie," "Berceuse Russe," Morse.
8:30 P. M.—Ida W. Bonelli, soprano soloist. Selections: "Safe in My Arms" and "Red Rose of Love," Gladwin.
8:45 P. M.—Ary Dulpher, violinist; Lillian Hirsh at the piano. Selections: "Variations from Serieuses," Corelli; "The Vision," Drydla; "Minuet," Dulpher; "Canzonetta," D'Ambrosio; "Melodie," Kreisler; "Spanish Dance," Sarasate, Mr. Dulpher; "Duet—The Lark," Glinka Balakirew; "Czardes," MacDowell, Miss Hirsh.
9:15 P. M.—Guy L. Baker, baritone soloist, of Beverly. Selections: "The End of the Road," Sanderson; "Swing Low, Sweet Chariot," Rogers; "On the Road to Mandalay," Speaks. Miss Gudrun Birch, accompanist.

FRIDAY.

8:00 P. M.—"Safe Motoring," by Frank A. Goodwin, registrar of motor vehicles, Commonwealth of Massachusetts.
8:15 P. M.—"Diphtheria," personal hygiene talk No. 13, by B. A. Welcome, executive secretary, junior department, American Red Cross.
8:30 P. M.—Conn band instrument concert. Solos by C. L'Orage, violin; E. C. Gatley, saxophone; N. Bernier, cornet; J. N. Proctor, trombone; F. Sordillo, barytone.

SATURDAY.

8:00 P. M.—"The Story of Money," by Harvey A. Wooster, Ph. D., Jackson professor of political science and head of department of economics.
8:15 P. M.—"Baby" Josephine Leonard of the Wyman School for Stage Children, in Scotch and jazz songs. Miss Leonard is only 7 years old, probably the youngest artist who has ever entertained by radio.
8:45 P. M.—Dorchestra Boys' Orchestra. Norman Tabias, leader, violin; Milton Werby, violin; Samuel Faber, saxophone; William Rosengarten, trumpet; Lewis Dehaan, piano; Sydney H. Hambro, drums.

Station WBZ, Springfield.
(Westinghouse.)
SUNDAY.

3:00 P. M.—Radio Chapel conducted by Wm. B. Grant, assistant pastor of the First Baptist Church.
8:00 P. M.—Church services by Dr. H. Paul Douglas, director of Church Survey which is being held in Springfield.

MONDAY.

7:30 P. M.—Baseball scores of the American, National and Eastern Leagues. Uncle Wiggily Bedtime Story from the Springfield Union. "Soldier Adams," of the Springfield College football boxing and track teams will give a talk on clean sports.
7:45 P. M.—Official United States Government and State crop and market reports, courtesy of the New England Homestead. Dever G. Ashmead, editor of Coal Age will give a talk on Anthracite Coal Mining.
8:00 P. M.—Baseball scores. Musical program by Mrs. Hector G. Roberts, soprano; May Vesaupels, pianist.

TUESDAY.

7:30 P. M.—Baseball scores. Uncle Wiggily Bedtime Story. "Playing the Game," by Frank Civiletto, captain of the Springfield College football team and member of the varsity basketball and baseball teams.
7:45 P. M.—Government and State crop and market reports, courtesy of the New England Homestead.
8:00 P. M.—Baseball scores. Program of classical selections by Mabel Humphrey, soprano soloist of the First Presbyterian Church.

WEDNESDAY.

7:30 P. M.—Baseball scores. "Thanks to the Gnomes," a Russian fairy tale, courtesy Cassino Publishing Company.
7:45 P. M.—Talk on Sportsmanship by Leonard Walters, captain of 1921 Springfield College football team, guard on 1922 basketball team, which was champion of New England, member of 1922 baseball team. Government and State market reports, courtesy of the New England Homestead.
8:00 P. M. Humorous reading by Edwin Esten. Hawaiian guitar selections by Frank W. May.

THURSDAY.

7:30 P. M.—Baseball scores. Uncle Wiggily Bedtime Story.
7:45 P. M.—"The Ten Commandments of a Good Sport," by B. F. Mooney, captain of the Springfield College Wrestling team and champion wrestler of New England. Mr. Mooney is also one of the star football players of Springfield College. Government and State market reports, courtesy of New England Homestead.
8:00 P. M.—Musical program of vocal and instrumental selections. Avis Hannum, soprano; Emma Hutchinson, pion.
8:30 P. M.—Selections by the Technical High School Banjo Club.

FRIDAY.

7:30 P. M.—Baseball scores. Uncle Wiggily Bedtime Story.
7:45 P. M.—"Athletics and the School," by Franklin J. Gray, director of physical education of the Springfield public schools. Government and State market reports, courtesy New England "Homestead."
8 P. M.—Vocal and instrumental selections. Helen Beckwith, alto; Max Sadelle, tenor; W. G. Stevens, bass. Violin solos by Forrest Towl.

SATURDAY.

7:30 P. M.—Baseball scores. "How the Toucan Got His Bill," courtesy of S. E. Cassino Publishing Company.
7:45 P. M.—Crop reports of V. F. Sanders, New England crop statistician, courtesy of New England "Homestead."
8 P. M.—Program of classical selections by Master Stewart A. Lyman, violinist; Myrtle C. Atchinson, piano.
8:30 P. M.—Barytone solos by Willard M. Clark.

Station WVP, Fort Wood, New York City.
(Signal Corps, U. S. A.)
MONDAY.

8:30 P. M.—Instruction in radio.
9 P. M.—Concert under the direction of Mr. Charles Isaacson.

TUESDAY.

8:50 P. M.—Instruction in radio.
9 P. M.—Concert under the direction of the Brooklyn "Eagle."

WEDNESDAY.

8:50 P. M.—Instruction in radio.
9 P. M.—Concert under the direction of Mr. Fred W. Hager of the Okeh Redord. Accompanist, Justin Ring; master of ceremonies, William Tilden. Concert as follows:
1. Breau and Sanders in new novelties: Nat Sanders, barytone; Louis Breau, pianist. 2. Dorothy Howkins Burke, "Homing" and "Call of the Robin." 3. Byron G. Harlan, tenor, "Who Tied the Can on the Old Dog's Tail?" "I'm a 12 o'Clock Fellow in a 9 o'Clock Town." 4. Joseph Phillips, barytone, "The Rosary." 5. Virginia Burt, soprano and Hawaiian guitar imitator, in her own compositions and Hawaiian novelties, &c. 6. William Tilden, comedy sketch, "Snider's Grocery Store." 7. Byron G. Harlan, "Uncle Josh on the Radio." Finale—Joseph Phillips, barytone; Virginia Burt, soprano, and entire company, "Kiss Me by Wireless."

THURSDAY.

8:50 P. M.—Instruction in radio.
9 P. M.—Concert under the direction of the William Knabe Company as follows: Idalia Hare, coloratura soprano; Juan Reyes, pianist. Other artists to be announced later.

FRIDAY.

8:50 P. M.—Instruction in radio.
9 P. M.—Concert by the Cosmopolitan Saxaphone Choir of Hackensack, N. J., as follows:
(a) "Stony Point," march, by L. P. Laurendeau; (b) "Invercargill," march, by Alex F. Lithgow; "Asleep in the Deep," ballad, by Petrie; "Khaki Bill," march, by Harry L. Watson; "Flower Song," serenade, arranged by Samuel Danks; "Leave Me With a Smile," fox trot, by Koehler and Burnett; "That's How I Believe in You," waltz ballad, by Bert Rule; "Comedy Tom," two step, by Gus King; finale, arranged by Samuel Danks.

SATURDAY.

8:50 P. M.—Answering of letters and questions submitted by the radio audience.
9 P. M.—"Modern Electrotherapeutics," by Dr. Frank B. Schanna, inventor of electromagnetic bath.